

## A CASE OF THREE TUMORS OF THE ENCEPHALON.

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ON January 3, 1880, a female, aged 20, a native of the United States, but of foreign parentage, single, applied for treatment to Dr. Amidon, assistant at Prof. Seguin's Clinic for Diseases of the Nervous System, at the College of Physicians and Surgeons, New York, when the following history was obtained.

She was in perfect health until July, 1879, when she commenced to have headache, followed in a few days by a severe chill, which lasted an hour and was succeeded by a fever of several hours' duration. At this time there was pain over the left eye and contraction of the left occipito-frontalis muscle. Headache has existed ever since, except that it is occasionally absent for a day or two. It is usually occipital, sometimes frontal, and is preceded by stiffness in the back of the neck. Her head, especially, feels hot; she thinks she has fever, to some extent, continually. Nausea has occurred at times. Complete amenorrhœa, and constipation have existed since the chill. She has not been confined to her bed but has felt ill during the whole period. For two months her left foot has felt dead, as if asleep, and she cannot move the toes. The left leg trembles when she walks, and is becoming weak. The left hand has been weak since the chill, and sometimes formication is felt in the tips of the fingers on the same side. Her

mother states that the mouth has been drawn to the left side for the past two weeks. She also states that the tongue has always been atrophied on the left side, and that she was always a little tongue-tied. There has been no dysphagia. She thinks that the patient is getting exophthalmic. This is confirmed also by the statement of Dr. Candidus of Williamsburg, who saw her before her sickness and again in November, when he treated her for hemiplegia with electricity. Three weeks ago diplopia was observed. Her vision has been blurred since childhood. Tinnitus aurium has been present for the past two or three weeks in the left ear. Specific or rheumatic trouble is denied. Her mother died of tuberculosis.

*Examination.*—There is complete right facial paralysis; paresis of right sixth nerve; not much weakness in the left hand. (With dynamometer, right, 14-12-13; left, 11-14-11.) All movements can be made, but there are some athetoid movements in the ring and little fingers. She cannot move the toes properly, and movements of the foot are very much restricted. The flexors of the thigh are especially weak. She has a hemiplegic walk. The tendon reflex is exalted. The ophthalmoscope reveals double optic neuritis. Potassium iodide was given in three-gramme doses three times a day; after a few days the headache disappeared for a brief period. She appeared at the clinic several times and then did not return. Later her vision failed rapidly until she became entirely blind. She had frequent attacks of vomiting, which ceased, however, some time before her death. About two weeks before her death more difficulty in articulation was noticed, and some dysphagia; this disappeared again. Her step-mother states that on the day before her death she was very much exhausted, and went to sleep at 9 o'clock A.M., slept until 5 o'clock P.M., when she awoke, complaining indistinctly and almost unintelligibly of acute pain on the top of her head; she could not swallow saliva, which accumulated and dribbled from her mouth. She died the following morning after a convulsive movement of the left arm.

At Dr. Seguin's request I made an autopsy fifteen hours after death, permission having been secured through the kindness of Dr. Candidus, who was present with Mr. W. T. Baker, student of medicine, to whom I am indebted for some of the notes in her case. Circumstances prevented

an examination of any thing but the cranial and orbital contents.

The cranium was normal. The dura was not adherent except at one point in the right parietal region, under which was found a tumor projecting above the level of the convolutions about one centimetre. Several vessels formed the connection between it and the dura. It was encapsulated by the pia mater which separated it completely from the convolutions which formed its bed. The tumor, globular in form, measured seven and five tenths centimetres in its antero-posterior diameter, seven centimetres transversely, and four and five tenths centimetres in depth. A section through it exhibited a firm structure, not much soft material being obtained on scraping the cut surface. It was quite vascular, however, and of a dark reddish-brown color. The microscopical examination of the tumor showed that it consisted, for the most part, of fusiform cells, with an oval, distinctly granular nucleus arranged in whorls and knots. The cells became more elongated toward the periphery of these knots, where it presented a distinctly fibrous appearance. All grades of these elements could be found from that of a cell consisting almost entirely of a nucleus through the various gradations of more or less fusiform cells, to long flattened fibres still retaining a nucleus near its centre. This knotted, twisted mass of spindle cells was quite richly supplied with capillary blood-vessels.

The convolutions forming the walls of the cavity in which the tumor was deposited, consisted of the upper half of the ascending frontal (anterior central) convolution, the upper two thirds of the ascending parietal (posterior central) convolution, all of the superior parietal lobule and part of the inferior parietal lobule. The convolutions posterior and to the outer side of these were compressed so as to form two or three concentric curves. All the convolutions de-

scribed by name were pressed directly downward or outward, except that part of the ascending parietal which forms the præcuneus on the median surface. It had been crowded against the opposite hemisphere until it was not thicker than ordinary bristol-board. The remaining portion of the ascending parietal convolution and also the superior parietal lobule as a whole formed the principal part of the floor of the cavity, and were flattened to nearly twice their usual breadth, but could be recognized by the fissure of Rolando (sulcus centralis) and the interparietal fissure. The secondary fissures had disappeared under the pressure of the tumor. No softening was found in these convolutions, no induration, nor in fact any change except the thinning, flattening, and general displacement produced by pressure. The pia mater appeared normal, except that there was marked venous congestion over both hemispheres. The whole right hemisphere was broader than the left, whose median surface was also pressed upon by the tumor, displacing it to a slight extent out of the median line. The ventricles contained a very little fluid. The central ganglia on the side of the tumor were somewhat flattened, but no evidence was found of any other abnormal appearances, either within or upon the cerebrum or its membranes. Unfortunately, the microscopical examination of the cortical portion which had undergone compression was entirely unsuccessful, as the specimen was not well hardened.

At the juncture of the pons with the medulla, in contact with the latter, and lying upon the inferior surface of the cerebellum, which it compressed to a slight extent, was found an irregular growth, two centimetres long, one centimetre thick at its thickest portion, and five tenths of a centimetre thick at its thinnest portion, attached to the left auditory and facial nerves, which ran over its inferior surface. The facial nerve did not seem to be involved by the growth,

but was easily stripped off. The auditory nerve was firmly attached to it and spread out upon it to three times its usual width, a portion apparently running through the tumor.

A microscopical examination after the tumor had been hardened in potassium bichromate and stained with hæmatoïdin, revealed a tissue similar in structure to the large tumor, except that the cells were more numerous and less fusiform, the fibrous and fully formed connective tissue being almost entirely absent. It was not as vascular as the large one, but the same whorl-like formation was present. In the superficial portions of the tumor, corresponding to the auditory nerve, were found nerve fibres. They seemed to be pretty well preserved, though in some places they seemed to be surrounded by the spindle cells of the growth, and in the deeper portions no nerve fibres could be found. There was no evidence of degeneration of nerve fibres.

The orbital cavities were opened from the cranial surface, and the posterior segments of the eyeballs removed, together with the optic nerves. The elevation of the swollen papillæ could be seen with the naked eye. After hardening in potassium bichromate, sections through the specimen in the long axis of the nerve exhibited it to a more marked degree, though the specimen was not in a proper condition to make objects capable of showing the finest histological details of the retinæ and papillæ. The nerve, however, exhibited complete absence of normal nerve fibres, and consisted of bundles of granular matter and finely fibrous material and lymphoid elements. Thickening of the walls of the vessels and distention of the perivascular spaces were observed. This condition of degeneration was traced beyond the commissure to the point where the optic tracts enter the cerebrum. The specimen was too soft to follow further, as was intended.

A transverse section through the pons at its centre and another through the medulla below the *striæ medullare* revealed nothing abnormal to the naked eye, even after hardening. On making a few transverse sections of the lowest segment, beginning at the upper surface, which was through the lower third of the floor of the fourth ventricle, a small round mass was discovered situated directly in the median line, and somewhat nearer the anterior than the posterior surface. This rapidly increased in circumference until at the *calamus scriptorius* it occupied more than one half the diameter of the section in any direction, involving a little more of the left side than the right, and coming nearer the posterior, than the anterior surface. From this point it rapidly decreased in size until only a small dot was left, which still occupied the median line. The outline of the tumor was somewhat irregular and very distinct. A microscopical examination revealed a structure similar to the other growths, although they were more cellular tissue even than in the auditory-nerve tumor. The surrounding tissue exhibited a remarkable preservation of the normal appearance. It seemed to have been crowded gently aside. The nerve fibres appeared crowded together in some portions like bands of sclerosed tissue. In other regions, at the circumference of the growth, a certain amount of sclerosis was found, but no other abnormal changes which were limited to any special parts or regions, with one exception to be mentioned presently. There were changes in all regions at the level of the tumor nearly everywhere, such as thickening of the walls of the blood-vessels and the presence of a larger number of lymphoid elements than usual, and occasional amyloid bodies. The calibre of the nerve fibres was extremely regular, and the nerve cells appeared normal, with here and there a doubtful exception in the shape of a

very granular cell and an irregular crenated appearance of the nuclei. The nuclei and roots of the cranial nerves presented a normal appearance, with the exception of the hypoglossal nucleus on the left side. Here the large motor cells were not more than one third as numerous as on the opposite side, and nearly all of them presented a shrunken appearance. As a rule they were small. This was determined from an examination of the whole column of cells and not from a single specimen. The nuclei and roots of the sixth and seventh were normal; also the acousticus roots and nuclei. There was no evidence of ascending or descending degeneration above or below the tumor.

Let us now review the facts. First, what is the nature of the morbid growths? They belong to the connective-tissue group of neoplasms, and will very properly bear the name of fibro-sarcoma. The two small growths may be fairly considered to be of more recent or of very much slower growth than the larger one, in that the formation of the fibrous tissue is very much less marked. The origin of the large tumor seems to have been from the pia mater. The growth on the auditory nerve seems to have originated in the nerve sheath. The tumor of the medulla appears to have started in the median line, probably from the vascular prolongations of the meninges.

One of the remarkable features of this case is that such extensive abnormal growths should have produced so little change in the neighboring parts, but as the lesion was excluded from all parts except the connective tissue, the effect of these bodies could only be that of pressure. Will the tumor in the right hemisphere account for the paresis on the opposite side? That part of the cortex which had been rendered thin by pressure (the upper part of the ascending parietal) corresponds to the motor centres from the lower extremity. The centres from the upper ex-

tremity (part of the ascending frontal convolution) escaped with less damage, and we find that the paresis in the hand was less than in the lower extremity. The motor centres from the facial muscles are situated too far externally to be affected by the pressure of the tumor to a great extent, and we have no facial paresis on that side. As the paresis was never very decided, the opinion is not unwarrantable that it was due to pressure on the regions described, producing changes which interfered with the nutrition of the part sufficiently to bring about an improvement of function. We cannot account for the paralysis of the seventh and paresis of the sixth nerves by any lesions found, and will not speculate upon it. The atrophy of the left side of tongue and the abnormal conditions found in the hypoglossal nucleus would seem to stand related to each other as cause and effect. How long this condition had existed is unknown; the step-mother stated that it had "always been so." The specimen does not give any evidence that the changes were recent; the attacks of dysphagia and inarticulate speech, the accumulation of saliva, and the marked disturbance in temperature might be expected from the pressure of a tumor on the medulla in a neighborhood where so many hypothetical centres, salivary, vaso-motor, etc., are supposed to exist. The tinnitus aurium in connection with the tumor of the auditory nerve is of interest. It is unfortunate that we have no record of her hearing. The optic nerve atrophy was found as was expected from the ophthalmoscopic examination.

*Explanation of Plates.*

Plate I. Fig. 1.—Right hemisphere showing size and location of tumor.

Fig. 2.—Tumor on auditory and facial nerves.

Plate II. Figs. 1-6.—Sections at different heights of tumor in medulla; nat. size.

Fig. 7.—Showing atrophy of hypoglossal nucleus.

Fig. 8.—Section of tumor.

Fig. 9.—Diagram showing longitudinal projection of tumor.

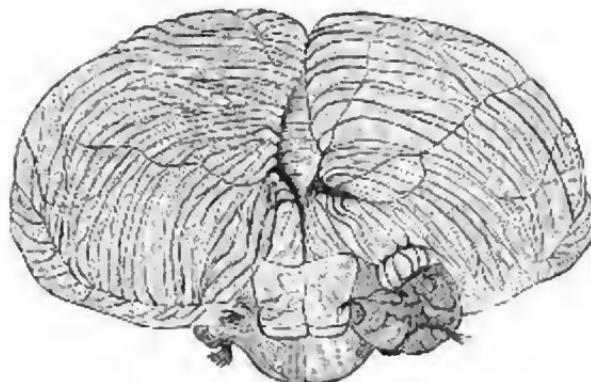
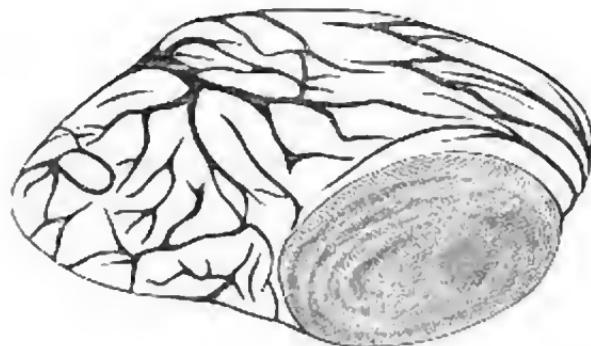




FIG 1



FIG 2



FIG 3



FIG 4



FIG 5



FIG 6



FIG 7



FIG 8

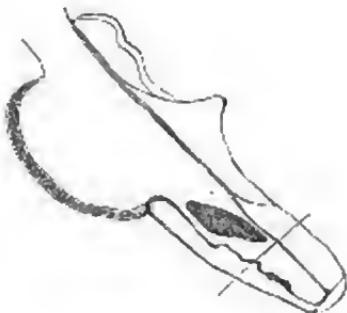


FIG 9